

Remarks

Reconsideration of this Application is respectfully requested.

Claims 1-24 are pending in the application, with claims 1, 12, and 14 being the independent claims. Based on the following remarks, Applicant respectfully requests that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Rejections under 35 U.S.C. § 102

The Examiner has rejected claims 1-24 under 35 U.S.C. § 102(b) as anticipated by Marcellin *et al.*, "A Trellis-Searched 16 KBit/Sec Speech Coder with Low Delay," ADVANCES IN SPEECH CODING, dated March 5, 1992 ("Marcellin"). Based on the following remarks, Applicant respectfully traverses.

Independent claims 1, 12 and 14 each generally relate to a novel way of performing vector quantization. In particular, independent claims 1 and 12 are directed to a method in a Noise Feedback Coding (NFC) system of searching N predetermined Vector Quantization (VQ) codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal. The method of claim 1 includes the steps of:

- (a) predicting the speech signal to derive a residual signal;
- (b) deriving a VQ input vector corresponding to a VQ error vector, based on the residual signal and a corresponding one of the N VQ codevectors;
- (c) repeating steps (b) for each of the N VQ codevectors to produce N VQ error vectors corresponding to the N VQ codevectors; and

(d) selecting the preferred VQ codevector as a VQ output vector corresponding to the residual signal based on the N VQ error vectors.

The method of claim 12 includes the steps of:

- (a) predicting the speech signal to derive a residual signal;
- (b) deriving N VQ input vectors each based on the residual signal and a corresponding one of the N VQ codevectors, each of the N VQ input vectors corresponding to one of N VQ error vectors; and
- (c) selecting the preferred one of the N VQ codevectors as a VQ output vector corresponding to the residual signal, based on the N VQ error vectors.

Independent claim 14 is directed to a Noise Feedback Coding (NFC) system for searching N Vector Quantization (VQ) codevectors stored in a VQ codebook for a preferred one of the N VQ codevectors to be used for coding a speech or audio signal.

The system includes:

- predictor logic adapted to predict the speech signal to derive a residual signal;
- an input vector deriver adapted to derive N VQ input vectors each corresponding to one of N VQ error vectors, based on the residual signal and a corresponding one of the N VQ codevectors; and
- a selector adapted to select the preferred one of the N VQ codevectors as a VQ output vector corresponding to the residual signal, based on the N VQ error vectors.

Marcellin does not teach or suggest each of the features of claims 1, 12 or 14.

Most significantly, Marcellin does not teach or suggest a way of performing vector quantization. Rather, Marcellin describes a speech coder that uses Trellis coded quantization (TCQ), which is very different from vector quantization. For example, as demonstrated by Marcellin, TCQ does not involve performing operations involving

groups of samples known as "vectors." In fact, Marcellin itself teaches that vector quantization is something different from TCQ:

The mean squared error (MSE) performance of TCQ is excellent. For encoding the memoryless uniform source, TCQ achieves a MSE within 0.21 dB of the distortion-rate function at all positive integral rates. This performance is better than that promised by the best lattices known in up to 24 dimensions [8]. In fact, evaluation of the asymptotic quantizer bound [9] indicates that ***no vector quantizer of dimension less than 69 can exceed the performance of TCQ*** for encoding the memoryless uniform source.

See Marcellin at p. 47, second paragraph (emphasis added).

Since Marcellin does not teach or suggest a way of performing vector quantization, it also does not teach or suggest the recited steps of claims 1 and 12 or the recited features of claim 14 dealing with Vector Quantization (VQ) input vectors, VQ codevectors, VQ error vectors and VQ output vectors.

In this regard, the Examiner stated that FIG. 1 of Marcellin discloses the recited method in a Noise Feedback Coding (NFC) system of "searching N predetermined Vector Quantization (VQ) codevectors for a preferred one of the N VQ codevectors to be used in coding a speech or audio signal." Although FIG. 1 of Marcellin does show a prior art NFC structure, it does not illustrate the recited method. In fact, the quantizer in FIG. 1 is alternately described as a scalar quantizer or a TCQ quantizer, but not a vector quantizer. See Marcellin, p. 49, last paragraph ("Consider now, using TCQ in place of the scalar quantizer of FIG. 1").

The Examiner further stated that Marcellin teaches the step of "deriving a VQ input vector corresponding to a VQ error vector, based on the residual signal and a corresponding one of the N VQ codevectors" at page 48, paragraph 3 through page 49,

paragraph 2. The cited text discusses properties of various elements of the NFC structure of FIG. 1 and appears to have nothing to do with deriving a VQ input vector as claimed.

Additionally, the Examiner stated that Marcellin teaches the step of "repeating steps (b) for each of the N VQ codevectors to produce N VQ error vectors corresponding to the N VQ codevectors" at page 50, paragraphs 1-2. The cited text discusses performing TCQ on a data sequence and appears to have nothing to do with producing N VQ error vectors as claimed.

The Examiner also stated that Marcellin teaches the step of "selecting the preferred VQ codevector as a VQ output vector corresponding to the residual signal, based on the N VQ error vectors" at page 50, paragraph 2 through page 51, paragraph 1 and Equation 10. The cited text and equation also relates to performing TCQ on a data sequence and appear to have nothing to do with selecting a VQ codevector as a VQ output vector as claimed.

Since Marcellin does not teach or suggest each and every feature of independent claims 1, 12 and 14, it cannot anticipate those claims. Accordingly, the Examiner's rejection of claims 1, 12 and 14 under 35 U.S.C. § 102(b) is traversed and Applicant respectfully requests that the rejection be withdrawn. Furthermore, claims 2-11, 13 and 15-24 are also not anticipated by Marcellin for at least the same reasons as the independent claims from which they depend and further in view of their own respective features. Accordingly, the Examiner's rejection of claims 2-11, 13 and 15-24 under 35 U.S.C. § 102(b) is traversed and Applicant respectfully requests that the rejection be withdrawn.

Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete reply has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

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